REMARKS

The application was filed with claims 1-16. Claims 1-9 were canceled by previous amendment. Claims 17-29 were added by previous amendments. Claim 12 has been canceled herein. New claims 30-36 have been added herein. Therefore, claims 10-11 and 13-36 are pending. However, claims 11 and 17-24 are withdrawn as being drawn to a non-elected invention. Likewise, new claims 34-36 are drawn to non-elected subject matter and are, presumably, also considered withdrawn. Thus, claims 10, 13-16, and 25-33 are currently under consideration. Claims 10, 13-16, and 25 have been amended herein. Additionally, withdrawn claims 11 and 17-18 have been amended herein.

To the extent that the Examiner deems cancellation of the withdrawn (and not rejoined) claims necessary for compliance with the patent rules, Applicant authorizes such cancellation by Examiner's amendment, wherein any cancellation is without prejudice to pursue the deleted subject matter in one or more divisional and/or continuation applications.

Telephonic Examiner Interview of August 9, 2007

Applicant appreciates the opportunity afforded by Examiner Chevalier to discuss the pending claims and nonobviousness thereof. Present in the teleconference were Examiner Chevalier, Dr. Philip Jacoby, and D. Brian Shortell. The pending claims, in particular claim 10, were discussed. Data from the specification and previously filed declaration of Philip Jacoby were discussed. The Examiner indicated that claim amendments with arguments directed toward the closest prior art and/or an additional declaration under 37 C.F.R. § 1.132 would be considered.

Request for Second Telephonic Examiner Interview

Should the Examiner disagree that Applicant's amendments, arguments, and submissions place the pending claims in condition for allowance, Applicant respectfully requests an opportunity for the inventor and counsel for Applicant to discuss fully with the Examiner the claimed invention and the reasons supporting the nonobviousness thereof in a telephone

interview. If necessary, and at Examiner's convenience, please contact the undersigned to schedule a teleconference with the inventor, Dr. Philip Jacoby.

Supplemental Information Disclosure Statement

Enclosed herewith is a Supplemental Information Disclosure Statement with a declaration under 37 C.F.R. § 1.132 of Philip Jacoby. Consideration of the information cited therein and indication of same is respectfully requested.

Claim Amendments

Claim 10 has been amended to recite, "An oriented web produced from perforated extruded sheet comprising a propylene polymer comprising beta-spherulites in an amount sufficient to produce a K-value of about 0.2 to 0.95 when measured by x-ray diffraction or to show a beta crystalline melting peak during the first or second heating scan when measured using a differential scanning calorimeter, wherein the oriented web is biaxially oriented and wherein the web has thickness in the node junction region between the machine direction and transverse direction strands that is at least 10% less than that of a biaxially oriented web made from an extruded polypropylene sheet with no added beta nucleant and the same starting sheet thickness."

Withdrawn claim 11 has been amended to recite, "A method for making an oriented web, wherein the oriented web is uniaxially oriented or biaxially oriented and wherein the web has thickness in the node junction region between the machine direction and transverse direction strands that is at least 10% less than that of a uniaxially oriented or biaxially oriented web made from an extruded polypropylene sheet with no added beta nucleant and the same starting sheet thickness, the method comprising the steps of:

(a) feeding a concentrate and a resinous propylene polymer to an extruder to melt from a polymeric sheet, wherein the concentrate comprises a propylene resin and a beta-nucleating agent, wherein the beta-nucleating agent is present in a concentration in a range of 1.2% to 0.036% by weight of the total polymer content,

(b) quenching the polymeric sheet at a quench temperature sufficient to produce a propylene sheet comprising beta-spherulites in an amount sufficient to produce a K-value of about 0.2 to 0.95 when measured by x-ray diffraction or to show a beta crystalline melting peak during the first or second heating scan when measured using a differential scanning calorimeter,

(c) extruding the quenched sheet,

(d) perforating the extruded sheet, and

(e) orienting the perforated sheet uniaxially or biaxially, wherein the orienting step comprises heating the perforated sheet to a temperature less than or equal to 155 °C."

Claims 13-16 have been amended for proper dependency upon claim 10, in view of the cancellation of claim 12.

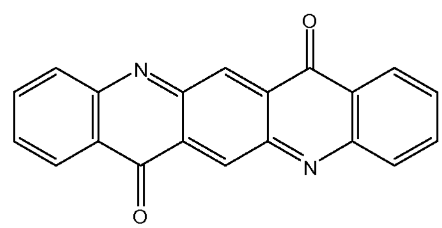
Claims 11 and 17-18 have also been amended to delete redundant recitation of concentration ranges.

Claim 25 has been amended to recite, "An oriented web produced from a perforated extruded sheet comprising a propylene polymer comprising beta-spherulites in an amount sufficient to produce a K-value of about 0.2 to 0.95 when measured by x-ray diffraction or to show a beta crystalline melting peak during the first or second heating scan when measured using a differential scanning calorimeter, wherein the oriented web is uniaxially oriented and wherein the web has thickness in the node junction region between the machine direction and transverse direction strands that is at least 10% less than that of a uniaxially oriented web made from an extruded sheet with no added beta nucleant and the same starting sheet thickness."

No new matter has been added by these amendments. All amendments are fully supported by the specification at, for example, pages 6-18 and the original claims, as filed.

New Claims

New claims 30-36 have been added herein. These claims are directed to, *inter alia*, aspects of the disclosed compositions and methods wherein a propylene polymer is selected from polypropylene homopolymer and copolymers of polypropylene containing other alpha-olefin monomers, wherein an extruded sheet is run at line speeds that are at least 5% faster than the line speeds for an extruded polypropylene sheet with no added beta nucleant and the same starting thickness, and wherein a beta-nucleating agent has the structural formula:



.

All new claims are fully supported by the specification, for example, as in withdrawn claims 13, 19, and 21. Thus, no new matter has been added.

Claim Rejections under 35 U.S.C. § 103(a)

As an initial matter, Applicant notes that no objection or rejection under 35 U.S.C. § 112 or 35 U.S.C. § 102 has now been applied to the pending claims, thereby indicating that the claims are definite, enabled, and novel. Consequently, Applicant understands that the sole remaining issue concerns the nonobviousness of the pending claims.

The Office Action has again rejected claims 10, 12-16, and 25-29 under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 4,374,798 to Mercer (hereinafter "Mercer") in view of U.S. Patent No. 5,310,584 to Jacoby *et al.* (hereinafter "Jacoby"). Applicant respectfully disagrees that the pending claims are obvious in view of the cited references.

Rather, claims 10 and 25 (and all other pending claims, which all depend from either claim 10 or claim 25) recite, *inter alia*, an oriented web . . . wherein the web has thickness in the

node junction region between the machine direction and transverse direction strands that is at least 10% less than that of a biaxially (or, for claim 25, uniaxially) oriented web made from an extruded polypropylene sheet with no added beta nucleant and the same starting sheet thickness. One of ordinary skill in the art would not have been motivated to combine the teachings of Mercer with the teachings of Jacoby to arrive at the claimed oriented webs.

Specifically, Jacoby discloses the use of a precursor thermoformable beta-nucleated sheet to produce thermoformed parts with improved end-use properties. Jacoby states that a sheet is thermoformed by heating the sheet to a temperature that "is sufficient to melt the beta spherulites but not the alpha spherulites, and thereafter forming the sheet under the influence of gravity, pressure, or vacuum." (See claim 1 of Jacoby in reexamination certificate issued on Feb. 16, 1999.) The reason for this requirement is fact that unmelted alpha spherulites reinforce the sheet against undergoing excessive sag in the thermoforming oven. In contrast, Mercer teaches the stretching of a perforated sheet in the solid state to produce a high tensile strength mesh structure. In order to achieve a structure with highly oriented, high-strength strands, this stretching must take place in the solid state. Since the web is preferably in a solid state to achieve highly oriented, high-strength strands, one of skill in the art would have been discouraged from employing beta-nucleating additives to produce the extruded sheet, as this would decrease its solid state character during the orienting process at conventional temperatures. Moreover, there is no direct analogy between the mesh structure of Mercer and the thermoformed article of Jacoby, since the precursor thermoformable sheet of Jacoby has no perforations or holes, and the oriented mesh of Mercer has no sidewalls.

Additionally, beta nucleation would not have been expected to improve the properties of the sheet used to make the plastic mesh of Mercer in the manner that beta nucleation improved the thermoformable sheet of Jacoby (*i.e.*, lower melting temperature of the beta-spherulites). Instead, while beta nucleation improves the properties of the final plastic mesh produced analogously to that of Mercer as well as the final thermoformed parts of Jacoby, the mechanisms of this improvement are entirely different in the two cases. That is, rather than taking advantage of the lower melting temperature of the beta-spherulites for thermoforming, as disclosed in

Jacoby, the instant methods and compositions take advantage of microvoids formed in the extruded sheet by the presence of beta-nucleating agents to facilitate uniform orientation of a perforated sheet to form an oriented web.

Nonetheless, while Applicant does not agree that the Office Action has properly set forth a *prima facie* obviousness rejection of any of the current claims, in order to expedite prosecution of the pending claims, Applicant has presented data in the as-filed specification as well as the declaration of Dr. Philip Jacoby submitted in a previous response that demonstrate the unexpectedly superior results of the claimed methods and compositions, as explained below.

First, oriented webs produced from perforated, beta-nucleated propylene sheets have a thickness in the node junction region between the machine direction and transverse direction strands that is less than conventional extruded sheets with no added beta nucleant (*e.g.*, those produced by the Mercer process). Specifically, as shown in Table 2 of the specification (reproduced below for the Examiner's convenience), the node thickness for an oriented web produced from perforated, beta-nucleated propylene sheets (INVENTIVE EXAMPLE; #2; 12 ppm beta-nucleant - Q-dye) has a node thickness of 1.80 mm, compared to a node thickness of 3.81 mm for an oriented web produced from a conventional extruded sheet with no added beta nucleant (MERCER EXAMPLE; #1, 0 ppm beta-nucleant - Q-dye).

TABLE 2

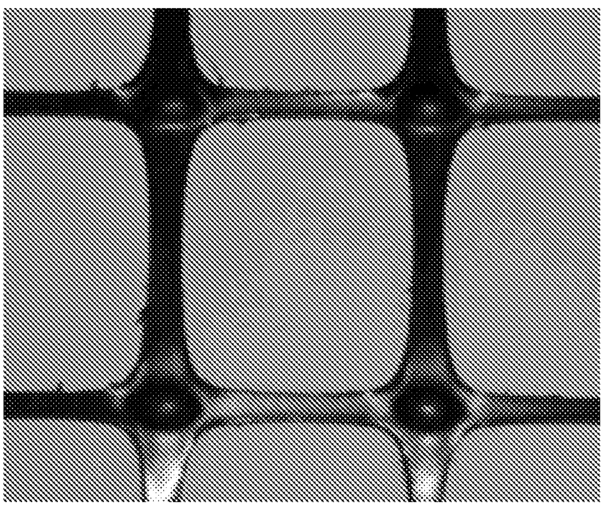
Sheet Dimensions For Non-pigmented Grid Products

#	Q-dye (ppm)	Mesh MD length1 (mm)	Mesh TD length2 (mm)	Mesh Area (mm^2)	MD Strand width3 (mm)	MD strand3 thickness (mm)	TD Strand width4 (mm)	TD strand4 thickness (mm)	MD strand cross-section area (mm^2)	TD strand cross-section area (mm^2)	Node width5 (mm)	Node width6 (mm)	Node thickness7 (mm)
1	0	27.76	34.81	966	3.23	1.79	3.27	1.15	5.78	3.76	10.6	9.3	3.81
2	12	22.96	36.17	831	3.43	1.92	3.63	1.14	6.59	4.14	11.2	11.7	1.80

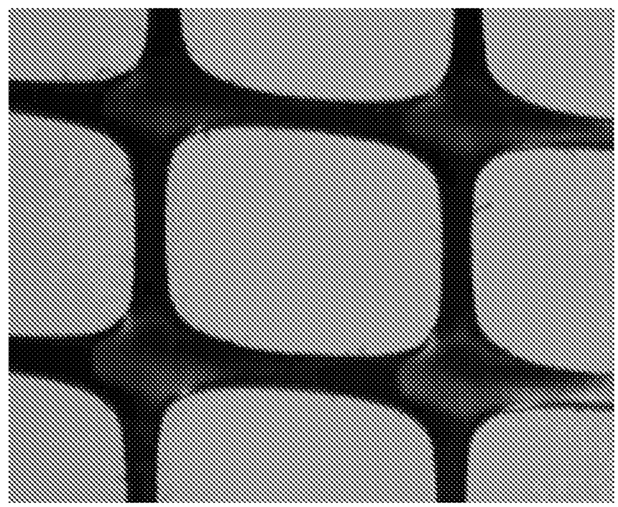
As described in the specification at pages 21-24, both samples were prepared by conventional techniques (*i.e.*, analogous to, if not identical to, that described in the Mercer reference), with the exception that Sample #2 contained 12 ppm beta-nucleant (Q-dye). In

contrast, Sample #1 contained no beta-nucleant, making this sample a control <u>analogous to, if not identical to, that described in the Mercer reference</u>. For this example, with a node thickness of less than 50% of that in conventional webs after orientation, the inventive webs thus have <u>more material in the strands between nodes</u>, thereby providing substantially more uniform oriented webs than grid produced by conventional techniques, <u>for example, those described in the Mercer reference, as demonstrated by comparison to Sample #2</u>.

The appearance of geogrids made with and without beta nucleation is illustrated below:



<u>NO</u> Beta Nucleation
(*e.g.*, Sample #2 – <u>MERCER</u>)



<u>WITH</u> Beta Nucleation
(*e.g.*, Sample #1 – <u>INVENTIVE</u>)

An unexpected result that was obtained when using beta nucleation to produce an oriented web from a perforated, beta-nucleated propylene sheet was the observation that the nodes in the mesh, which represent un-oriented material from the starting sheet that resides at the intersection of the oriented strands, was greatly reduced in thickness <u>relative to that of a web produced by the original Mercer technology</u>. This difference is illustrated above (as well as by the figures shown in the May 23, 2007 Jacoby Declaration). <u>The figure labeled "NO Beta Nucleation" was made using the Mercer process, and it exhibits distinct raised nodes</u>. The figure

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labeled "WITH Beta Nucleation" illustrates that the nodes have now flattened out, and the material that was present in the nodes of the Mercer product has now been re-distributed into the oriented strands. The node and strand thickness data given in Tables 2, 3, and 4 of the specification also illustrate a dramatic reduction in node thickness and the re-distribution of polymer into the strands, when the precursor sheet is beta-nucleated. This redistribution of polymer increases both the strength and rigidity of the final geogrid (mesh) since these properties are most influenced by the oriented strands.

From the specification, one of skill in the art would readily appreciate that the flattening of the nodes observed in the beta nucleated extruded sheet results from node region polymer being re-distributed into the oriented strands. Since these oriented strands, which provide the geogrid with strength and rigidity, now contain more polymer, the resulting geogrid has improved strength and rigidity. There is nothing in Mercer or Jacoby that would have predicted this effect. In contrast, in the Jacoby reference, the observed strength and stiffness improvements result from more uniform wall thickness and thicker walls in the final thermoformed polypropylene container. There are no nodes in a thermoformed container, since the extruded sheet is not perforated, and the walls of the container have no openings. Therefore the mechanism for improving the strength and rigidity of a thermoformed container produced using beta nucleation is completely different from the mechanism which operates in a geogrid.

Second, oriented webs produced from perforated, beta-nucleated propylene webs have improved tensile strength compared to conventional extruded sheets with no added beta nucleant. Specifically, as shown in Table 4 (reproduced below for the Examiner's convenience) of the specification, the machine direction ultimate tensile strength (24.3 kN/m) and the transverse direction ultimate tensile strength (36.4 kN/m) for an oriented web produced from perforated, beta-nucleated propylene webs (<u>INVENTIVE</u> EXAMPLE; sample 3, 12 ppm beta-nucleant - Q-dye) is much greater than the machine direction ultimate tensile strength (19.2 kN/m) and the transverse direction ultimate tensile strength (28.8 kN/m) for an oriented web produced from a conventional extruded sheet with no added beta nucleant (<u>MERCER</u> EXAMPLE; sample 6; 0 ppm beta-nucleant - Q-dye).

TABLE 4

Physical Properties of Biaxially Oriented Black Grids

Sample	Q-dye (ppm)	Extruded Sheet Thickness (mm)	2% MD Tensile (kN/m)	2% TD Tensile (kN/m)	5% MD Tensile (kN/m)	5% TD Tensile (kN/m)	MD Ult. Tensile (kN/m)	TD Ult. Tensile (kN/m)	Mass (kg/m2)	Torsional (cm-(kg/deg)
6	0	4.5	6.0	9.0	11.8	19.6	19.2	28.8	0.313	6.5
3	12	4.5	7.9	13.0	13.2	23.3	24.3	36.4	0.309	8.7
4	12	4.15	7.6	11.5	12.6	21.4	23.9	32.2	0.268	9.1
5	12	3.84	7.6	11.6	12.8	21.3	23.4	31.0	0.254	8.0

Again, as described in the specification at pages 21-24, both samples were prepared by conventional techniques (*i.e.*, analogous to, if not identical to, that described in the Mercer reference), with the exception that Sample 3 contained 12 ppm beta-nucleant (Q-dye). In contrast, Sample 6 contained no beta-nucleant, making this sample a control analogous to, if not identical to, that described in the Mercer reference. In this example, with an ultimate tensile strength of at least 25% greater than that for conventional webs after orientation, the claimed webs provide substantially stronger oriented webs than grids produced by conventional techniques, for example, those described in the Mercer reference.

Third, oriented webs produced from perforated, beta-nucleated propylene webs have increased torsional stability compared to conventional extruded sheets with no added beta nucleant. Specifically, as shown in Table 4 of the specification (see above), the torsional stability (8.7 cm-kg/deg) for an oriented web produced from perforated, beta-nucleated propylene webs (INVENTIVE EXAMPLE; sample 3, 12 ppm beta-nucleant - Q-dye) is much greater than the torsional stability (6.5 cm-kg/deg) for an oriented web produced from a conventional extruded sheet with no added beta nucleant (MERCER EXAMPLE; sample 6, 0 ppm beta-nucleant - Q-dye).

Again, as described in the specification at pages 21-24, both samples were prepared by conventional techniques (*i.e.*, analogous to, if not identical to, that described in the Mercer reference), with the exception that Sample 3 contained 12 ppm beta-nucleant (Q-dye). In

contrast, Sample 6 contained no beta-nucleant, making this sample a control analogous to, if not identical to, that described in the Mercer reference. For this example, with a torsional stability of at least 33% greater than that of that for conventional webs, the inventive webs provide substantially more stable oriented webs after orientation than grids produced by conventional techniques, for example, those described in the Mercer reference. This torsional stability is again a consequence of a redistribution of polymer from the node regions to the oriented strands when the precursor sheet is beta nucleated.

Fourth, oriented webs produced from perforated, beta-nucleated propylene webs can be prepared from thinner extruded sheets having a lower mass per area (basis weight) compared to conventional extruded sheets with no added beta nucleant, while still maintaining physical properties (*e.g.*, tensile strength and torsional stability) that exceed that of the heavier, non-nucleated webs. Specifically, as shown in Table 4 of the specification (see above), an oriented web produced from perforated, beta-nucleated propylene webs (INVENTIVE EXAMPLE; sample 3; 12 ppm beta-nucleant - Q-dye; 4.5 mm; 0.309 kg/m^2) has the same extruded sheet thickness and a similar mass per area to that of an oriented web produced from a conventional extruded sheet with no added beta nucleant (MERCER EXAMPLE; sample 6; 0 ppm beta-nucleant - Q-dye; 4.5 mm; 0.313 kg/m^2), while exhibiting substantially superior tensile strength and torsional stability (*see, e.g.*, Table 4, columns 3-8 and 10). Further, as also shown in Table 4 of the specification, oriented webs produced from the claimed perforated polypropylene webs (INVENTIVE EXAMPLE; sample 4; 12 ppm beta-nucleant - Q-dye; 4.15 mm; 0.268 kg/m^2) (INVENTIVE EXAMPLE; sample 5; 12 ppm beta-nucleant - Q-dye; 3.84 mm; 0.254 kg/m^2) each have a lower extruded sheet thickness and a lower mass per unit area compared to an oriented web produced from a conventional extruded sheet with no added beta nucleant (MERCER EXAMPLE; sample 6; 0 ppm beta-nucleant - Q-dye; 4.5 mm; 0.313 kg/m^2), such as a grid described in the Mercer reference, while still exhibiting superior tensile strength and torsional stability (*see, e.g.*, Table 4, columns 3-8 and 10).

Again, as described in the specification at pages 21-24, both samples were prepared by conventional techniques (*i.e.*, analogous to, if not identical to, that described in the Mercer

reference), with the exception that Samples 3, 4, and 5 each contained 12 ppm beta-nucleant (Q-dye). In contrast, Sample 6 contained no beta-nucleant, making this sample a control analogous to, if not identical to, that described in the Mercer reference.

Thus, the claimed invention can provide substantially stronger, more uniform, and more stable oriented webs at a lower web thickness and mass per area, compared with conventional techniques, for example, those described in the Mercer reference. These superior properties of the oriented webs produced from perforated, beta-nucleated propylene webs would not have been expected by a polymer chemist at the time the application was filed. Specifically, it would not have been obvious to use a beta nucleated polypropylene employed in a thermoforming process as a starting material in the process disclosed in the Mercer reference, which involves biaxially orienting a perforated polypropylene sheet, to produce stronger, more uniform, and more stable oriented webs at a lower web thickness and mass per area.

Request for Rejoinder of Method Claims

In view of the nonobviousness of product claims 10, 13-16, and 25-33, Applicant respectfully requests rejoinder of withdrawn method claims 11, 23-24, and 34-36:

> The propriety of a restriction requirement should be reconsidered when all the claims directed to the elected invention are in condition for allowance, and the nonelected invention(s) should be considered for rejoinder. Rejoinder involves withdrawal of a restriction requirement between an allowable elected invention and a nonelected invention and examination of the formerly nonelected invention on the merits.
>
> MPEP § 821.04.

Product claims 10, 13-16, and 25-33 are allowable; method claims 11, 23-24, and 34-36 include all the limitations of at least one of allowable product claims 10, 13-16, and 32-33 and/or 25-31. MPEP § 821.04(b) states that "if applicant elects a claim(s) directed to a product which is subsequently found allowable, withdrawn process claims which depend from or otherwise require all the limitations of an allowable product claim will be considered for rejoinder." MPEP § 821.04(b) also states that "[p]rocess claims which depend from or otherwise include all the

limitations of the patentable product will be entered as a matter of right if the amendment is presented prior to final rejection or allowance."

In the event that the Examiner proceeds as requested – and method claims 11, 23-24, and 34-36 are rejoined and found allowable (for at least the reasons the product claims are allowable) – Applicants authorize the Examiner to cancel withdrawn concentrate claims 17-22 by Examiner's Amendment, provided such action will enable the issuance of a formal Notice of Allowance for claims 10-11, 13-16, and 24-36 and provided any cancellation is without prejudice to pursue the deleted subject matter in one or more divisional and/or continuation applications.

CONCLUSION

In light of the above arguments, the claims are believed to be allowable, and Applicant respectfully requests notification of same. The Examiner is invited and encouraged to directly contact the undersigned if such contact may enhance the efficient prosecution of the application to issuance.

A three-month shortened statutory period was set for response, nominally ending September 27, 2007. Enclosed herewith is a Request for One Month Extension of Time, which extends the due date to Saturday, October 27, 2007. Therefore, this paper is timely. Payment in the amount of $240.00 (reflecting the $180.00 fee for the Supplemental Information Disclosure Statement and the $60.00 fee for the Request for One Month Extension of Time for a small entity) is made concurrently herewith to be charged to a credit card. No further fee is believed due. However, the Commissioner is hereby authorized to charge any fees that may be required or credit any overpayment to Deposit Account No. 14-0629.

Respectfully submitted,
NEEDLE & ROSENBERG, P.C.

/D. Brian Shortell/

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CERTIFICATE OF EFS-WEB TRANSMISSION UNDER 37 C.F.R. § 1.8

I hereby certify that this correspondence – including any items indicated as attached, enclosed, or included – is being transmitted by EFS-WEB on the date indicated below.

/D. Brian Shortell/ — October 26, 2007

D. Brian Shortell, JD, PhD — Date